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Risk factors of warehouse receipt pledge : a research based on risk assessments for Chinese logistics enterprises

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Risk Factors of Warehouse Receipt Pledge

- A Research Based on Risk Assessments for Chinese Maritime Logistics Enterprises

By

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DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

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ABSTRACT

Title of Dissertation: **Risk Factors of Warehouse Receipt Pledge**
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This dissertation is concerned with risk analysis of Warehouse Receipt Pledge (WRP) business based on the application of risk theory as well as principle component analysis methodology. It is aimed at helping logistics providers engaged in WRP take appropriate measures to manage risks effectively during business process. Simultaneously, it explicitly clarifies the risks regarding the business flow of WRP and how it becomes bridge to integrate conventional logistics business with finance business.

In order to enable logistics providers to adopt right ways to address identified categories of risk, it combines China Shipping Line (CSL) as a research case with risk theory and PCA methodology. Risks are examined through business disputes. There were 17 disputes taken place at CSL in recent years. Expert Evaluation Method is applied in the assessment of risk factors related to each dispute. Analysis using SPSS 18 is conducted so as to find out weight of influence caused by each risk factor. As a result, the aggregated loss of each risk delegated as consequence is acquired. Meanwhile, likelihood of each risk is calculated by the number of occurrence of each risk. Therefore, the value of each risk is achieved in term of $R = P \times C$ (Risk = Probability x Consequence) and the aggregated value for each category of risk is fulfilled accordingly. As per the numeric size of each category of

risk, it summarized that the higher the R, the riskier. CSL should determine to take either preventive or precautious step towards different risks in order to mitigate them.

In the final part of the dissertation, conclusions are drawn with regard to the contribution and deficiency and to the analysis of the risk of WRP from the standpoint of logistics providers rather than commercial banks. It is hoped that it will be helpful for logistics providers to control the fundamental risks regarding WRP within limited resources. It also points out that Cost Benefit Analysis should be carried out as future study on WRP.

KEYWORDS: Warehouse Receipt Pledge, $R = P \times C$, Principle Component Analysis, CSL, Risk, SPSS 18

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List of Abbreviations

AHP	Analytic Hierarchy Process
CBA	Cost Benefit Analysis
CSL	China Shipping Logistics Company Limited
COSCO	China Ocean Shipping (Group) Company
CMA	Collateral Management Agreement
FTW	Finance, Transportation, Warehouse
GDP	Gross Domestic Product
IDEF	ICAM (Integrated Computer Aided Manufacturing) Definition
LPI	Logistics Performance Index
MLFRE	Model of Logistics Finance Risk Evaluation
NPV	Net Present Value
PC	Principal Component
PCA	Principal Component Analysis
RFID	Radio Frequency Identification
SAFEX	South Africa Futures Exchange
SMEs	Small and Medium-sized Enterprises
SOM	Self-organizing Map
UPS	United Parcel Service
US	United States
WRP	Warehouse Receipt Pledge

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Chapter 1 Introduction

1.1 Background of research

Today, the world economy has turned to be more inter-connected, and such inter-connection is becoming more and more efficient, reliable and cost-effective. Supply chains have become necessities in global trade. Trading in a timely manner with minimal transaction cost could cause a country to be eligible to expand overseas markets and improve its overall economic competitiveness. In many countries, identifying bottlenecks of a supply chain and then determining which logistics procedures to upgrade would be a challenging feat. As the backbone of international trade, logistics encompasses freight transportation, warehousing, border clearance, payment systems, and many other functions. These function are performed mostly by private logistics providers for private traders and owners of goods, but logistics is also important to the public policies of national governments and regional or international organizations. The importance of logistics performance for economic growth, diversification and poverty reduction has been widely recognized. Logistics Performance Index (LPI) score reflects perceptions of a country's logistics based on efficiency of customs clearance process, quality of trade and transport related infrastructure, ease of arranging competitively priced shipments, quality of logistics services, ability to track and trace consignments, and frequency with which shipments reach the consignee within the scheduled time. The index ranges from 1 to 5, with a higher score representing better performance. In 2012, the highest LPI score was Singapore ranked No.1. The LPI score for China was 3.52 ranked No. 26, while the LPI score for United States was 3.93 ranked No.9 (The World Bank, LPI Result 2012). Apparently, the more developed the country, the more efficient its logistics business. How to effectively control logistics cost will be critical to each country in

the near future.

Table 1 - LPI of China and top 10 performers in 2010 and 2012

Economy	2012			2010		
	LPI rank	LPI score	% of highest performer	LPI rank	LPI score	% of highest performer
Singapore	1	4.13	100.0	2	4.09	99.2
Hong Kong SAR, China	2	4.12	99.9	13	3.88	92.4
Finland	3	4.05	97.6	12	3.89	92.6
Germany	4	4.03	97.0	1	4.11	100.0
Netherlands	5	4.02	96.7	4	4.07	98.5
Denmark	6	4.02	96.6	16	3.85	91.4
Belgium	7	3.98	95.3	9	3.94	94.5
Japan	8	3.93	93.8	7	3.97	95.2
United States	9	3.93	93.7	15	3.86	91.7
United Kingdom	10	3.90	92.7	8	3.95	94.9
China	26	3.52	80.5	27	3.49	79.9

Source: The World Bank

Nevertheless, irrespective of support in terms of finance and tax policies from each country, logistics service providers are still the mainstay to decrease logistics costs. The core problem for logistics entities is how to improve their profitability and competitiveness, and how to restructure their business models aside from

conventional logistics services such as forwarding, warehousing, and transportation. Due to the current economic recession, there has been a fresh logistics concept emerged in recent years in China. It is called finance logistics and most maritime logistics companies have accepted it and tried to apply it in some way. Due to the infancy stage of finance logistics, risks definitely could happen because of lack of ancillary regulations.

In industrialized countries, the main kind of warehouse receipt was oriented to agricultural products during the mid-20th century (Varangis & Larson, 1998). At that time, warehouse receipt could not only be pledged toward a bank loan, but also circulated in the market as a means of payment during trade. In 1916, the United States enacted the law of warehouse storage bill and set up a set of relevant and systematic WRP regulations (US Warehousing Act of 1916).

Developing countries' experience with warehouse receipt systems is limited, but there provides many important lessons. India has adopted appropriate legislation and supporting regulations. In the past, sophisticated agricultural markets including thriving futures markets flourished in India. During 1987-88, credit systems in Mali were established based partly on semi-wholesalers and wholesalers, however, government-imposed conditions and delays rendered the system ineffective. In Ghana, a pilot project for maize started in 1993 with financing from the African Development Bank (Coulter & Poulton, 2001). Despite the dominant position of a local marketing board the system proved successful, and a private bank and trading firm have since entered the program. In 1993 the Turkish Soil Products Office introduced a system of warehouse receipt under which it accepts grain delivered by farmers to its storage facilities and issues warehouse receipts. Several countries in Latin America have introduced warehouse receipts as well. In many cases, however,

the receipts are not widely used because of the low return to storage resulting from government policies, high interest rates, an inadequate legal environment (e.g. collateral laws, liquidation procedures, property rights), and lack of uniform grades and standards. In South Africa, warehouse receipt is an integral part of SAFEX, that country's successful commodity futures exchange (Varangis & Larson, 1998).

With the continuous development of the banking sector and futures industry, some financial institutions, such as BNP Paribas, and Citibank have commenced cooperation with logistics and warehousing companies. In 1999, Morgan Stanley Investment lent 350 million US dollar to Redwood Trust to carry out finance logistics business (Biederman, 2004). In 2001, UPS took over US First International Bank and restructured it to its own UPS Capital Corporation to support SMEs (Rutberg, 2002). After successfully developing finance businesses, many logistics companies have started to get involved in finance logistics business.

Because of the rigorous controls on the business of finance logistics, Chinese domestic logistics companies would have to cooperate with local banking institutions rather than develop finance logistics businesses by themselves. In China, finance logistics business is primarily provided by third-party logistics companies. Apart from traditional logistics business, contemporary third-party logistics companies are beginning to seek cooperation with financial institutions to provide additional finance services. The research direction of Chinese scholars who are engaged in studying finance logistics is destined to "commodity bank". Their studies are mainly based on the perspective of financial service instead of logistics (Yu & Feng, 2003). In the first ten years of this century, finance logistics business in China has become vital to third-party logistics entities. For example, COSCO logistics and CSL which are the two most well-known logistics providers have recognized finance logistics as

core business. Both of them have designed operational modes of maritime, land transport and warehouse on the basis of pledged goods (Zhou & Zhang, 2009). Moreover, finance logistics could help small and medium-sized enterprises to fully utilize loans for business development (Juuso et al, 2008).

1.2 Purpose and objectives of research

Recently, China is challenged with problems on how to invigorate SMEs. At present, the key financing channel for SMEs is bank loans, while due to its vulnerability of external environmental impact, SMEs have difficulties obtaining loans from commercial banks because of lack of transparency and fixed assets (Li & Yan, 2011). In fact, SMEs have inventories of goods, on-way products and raw materials which could be pledged goods. How to bridge the gap between commercial banks and SMEs has become a critical issue. For the purpose of solving current bottlenecks, commercial banks attempt to cooperate with third-party logistics companies to initiate WRP business as a bridge. To a certain extent, it can become feasible to solve the information asymmetry between commercial banks and SMEs.

WRP is an extension of traditional warehousing business and could effectively bypass financial bottlenecks for SMEs in the long term. A good running mode of WRP could achieve a tripartite win amongst logistics companies, commercial banks and SMEs. Conventionally, warehousing business is one node of the supply chain, after having implemented WRP business, it could be the capital convertible node.

However, due to the infancy stage of WRP in China, commercial banks and logistics companies are void of sufficient experience, relevant regulations and laws. Risk management becomes important for the tripartite to minimize loss along with

business booming.

The purpose of this dissertation is to classify corresponding risks of WPR by using a quantitative and qualitative method in order to improve the capability of risk management for CSL.

The objectives of the dissertation are to:

1) Help traditional maritime logistics companies to promote value-added service and increase competitiveness through WRP.
2) Help maritime logistics companies to extend logistics services which are centered on WRP.

1.3 Literature review

1.3.1 Current research on finance logistics and WRP

WRP had been studied in western countries by many relevant scholars since it was invented in its early stage and was called inventory pledge business. Friedman (1942), Koch (1948), Dunham (1949) and Eisenstadt (1966) analyzed inventory pledge financing and accounts receivable financing respectively to identify the appropriate business model and resolve the problem regarding how to implement storage and supervision, what the concrete business flow in actual operation is and how to develop under the condition of legal environment. Birnbaum (1948) studied the fundamental business flow of inventory pledge loans and presumable financing method from the economic point of view on the premise of inventory. With the development of WRP business, inventory pledge as security for loans extended to a variety of modes. Elsenstadt (1966) did comprehensive research on U.S. existing

inventory pledge loans (Yao, 2010). Barnett (1997) summarized the entities which could offer inventory pledge loans to financing enterprise (Yao, 2010). Rutberg (2002) took UPS as an example to introduce the main characteristics of innovative logistics finance model. Warren deemed that there were plenty of chances for cost saving and value creation in capital management of the supply chain (Buzacott, 2004). Berger and Udell (2006) carried out research about the choice of pledged assets in warehouse as well as relevant collateral. Fenmore (2004) analyzed newly occurred order financing businesses which derived from WRP business (Yao, 2010). He considered that it could settle the financing problem for some ordinary reputable enterprises without additional assets when they demand capital seasonally and irregularly. Berger (2004) put forward, initially, the new idea and framework for SMEs to get easily financed on the basis of WRP (Yao, 2010). Klapper (2005) studied the value-added mechanism and function of financing models on WRP for SMEs (Yao, 2010). She thought that financing based on WRP was an effective way to release the capital constraint of the supply chain.

As far as risk of WRP was concerned, Buzacott and Zhang (2004) defined several vital risk indicators which were related to interest rate and loan amount and emphasized the effect of those indicators on WRP business. Neville (2008) analyzed the value of inventory and illustrated the attentive point of operating an inventory pledge business.

During recent years, WRP has been extensively applied by many developing countries mainly in the range of agricultural products because of credit restrictions. It could be seen as an efficient passage to create capital mobility and credit. Giovannucci, Varangis, and Larson (2007) described the interactive relationships in the warehouse receipt system and dictated the function of each participant, such as

the role of government, farmer, agricultural product, bank, international institution and so on.

In China, WRP initiated academic debate from 1997, Zhou (2006) defined logistics finance and described the risk bypass of logistics finance. Chen and Zhu (2005) analyzed logistics finance from each participant's point of view. They dictated logistics finance by way of supply chain for the first time. Yu and Feng (2003) published an article to explain the risk management of logistics finance. Chen (2006) categorized the different types of WRP business and explained concretely the business. Liu (2007) classified the risk of WRP as credit risk, warehouse receipt risk, law risk, operation risk and so on. Yang, Chen, and Ren (2008) published an article titled "Research on risk management of WRP business". They enriched the scope of risk in WRP. In 2004, Dai (2004) discussed the practical meaning, business flow, and operation risk of WRP and analyzed how to address key problems during business operation. In 2006, Tang and Qiao (2006) demonstrated the feasibility of logistics finance for SMEs from the perspective of risk control by Game Theory. They believed the risk could be controlled by management information systems. In the same year, Zeng (2006) analyzed the risk from the stance of commercial banks. Ding (2008) set up a MLFRE model to evaluate the risk brought by logistics finance. In 2009, Xie (2009) adopted IDEF3 to analyze the business flow of WRP, described the evaluation indicator of risk and evaluated the risk of WRP from the perspective of third-party logistics companies based on SOM Neural Network methodology.

In practice, WRP has become popular for commercial banks, third-party logistics companies and SMEs (Li, 2007). Many participants have signed cooperative agreements multilaterally. For example, CSL has established long-term cooperative relationships with several dozens of Chinese well-known commercial banks, such as

Industrial & Commercial Bank of China, Bank of Communications, and China Merchant Bank. The annual revenue originated from WRP has increased tremendously. Likewise, other maritime logistics companies, like COSCO logistics, are also active in engaging WRP.

Different from previous research, the dissertation tries to integrate WRP with risk assessment to discover the proper way for the sake of reducing risks regarding WRP on behalf of CSL. In the past time, most scholars studied WRP simply from the stance of commercial banks (Pu X. J. et al, 2008). In addition, maritime logistics companies are more advantageous than other logistics companies which are subordinate to manufacturers because WRP business could be broadened from static pledge to dynamic pledge. It should not be rigorously limited to the warehouse itself. Maritime logistics companies could offer pledge services during the period of door-to-door logistics service and it could be beneficiary for SMEs to obtain longer-term financial support from commercial banks.

1.3.2 Innovative points of the dissertation

In spite of the fruitful research by foreign and Chinese scholars on WRP, there still exist some insufficiencies in the study of WRP. As we know, maritime transport is one of the most important modes of transportation. In China, main maritime logistics companies have re-positioned their traditional logistics businesses from simple water-way transport to more advanced supply chain businesses. WRP business becomes acceptable to maritime logistics companies because it is an integrated point between financial business and logistics business. It is a commercial opportunity for maritime logistics companies to widen their classic business. Although maritime logistics companies have implemented WRP business for more than a decade, fewer

researchers have studied WRP for maritime logistics companies academically.

1.4 Outline and general summary of each chapter

1.4.1 Outline of dissertation

The main structure of the dissertation encompasses five chapters and is drafted as shown in the Figure 1.

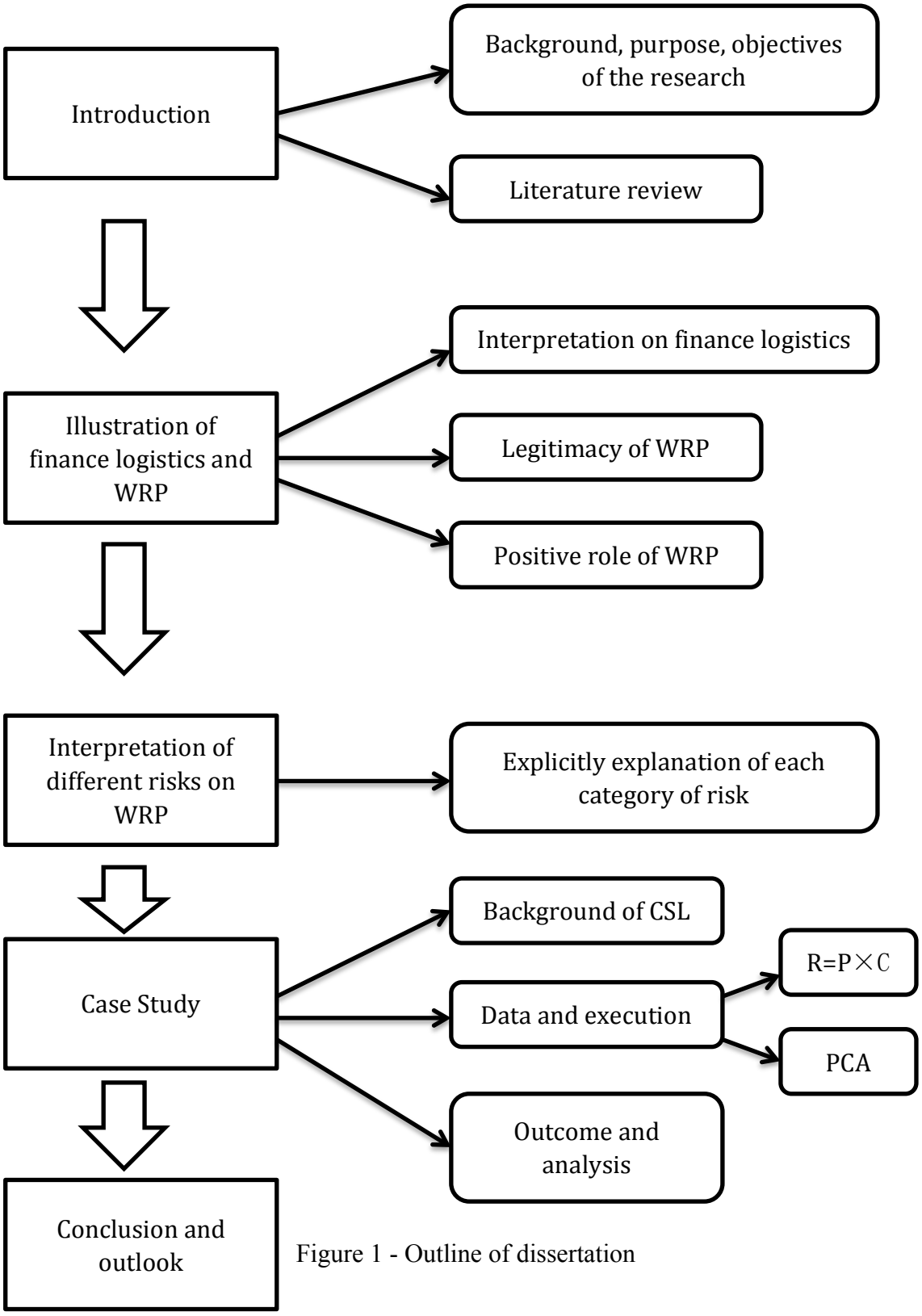

Figure 1 - Outline of dissertation

1.4.2 General summary of each chapter

Chapter 1 is the introductory part which dictates the background, meaning, and purpose of the research and demonstrates the value and practicality of the research. At the same time, it denotes that WRP is one of the most critical business models in finance logistics business for foreign and Chinese third-party logistics companies. Moreover, it describes the status quo of the research regarding WRP and discovers where the drawbacks are. It puts forward innovative ideas which could be valuable for third-party logistics companies to find risks when WRP business is implemented.

Chapter 2 is concretely describes finance logistics and WRP respectively. It illustrates what finance logistics is and how finance logistics business evolved and developed in third-party logistics companies. Simultaneously, it introduces the WRP business flow in detail.

Chapter 3 goes to identify and analyze the risks of WRP in general. It explains each risk factor which influences the healthy business operation of maritime logistics companies. Meanwhile, thanks to the rapid development of WRP business in China, there exist some specific risks which should be treated and controlled by Chinese maritime logistics companies with high attention. This chapter highlights five risks of WRP as follows.

1) Risk of pledged goods refers to pledged goods which should be classified by rank such as priority, prudence, restriction, or forbidden. For example, raw material should be classified as priority to be collateral.
2) Risk of various techniques is another elementary risk factor to handle WRP which needs mature techniques to guarantee that pledge business is operated smoothly. These techniques include custodian technique, assessment capability

technique and information system.

3) Risk of business operation and supervision means that the main assignment for maritime logistics companies is to supervise the pledged goods and keep the goods safe. In the meantime, maritime logistics companies ought to assure the reasonable quantity of goods kept in their control. During the supervision of pledged goods, maritime logistics companies must manage them in good order.
4) Risk of customer credit refers to the credit status and credit rating of SMEs (loaned companies). Maritime logistics companies should observe the autonomous management capability of SMEs from time to time and their previous credit.
5) Risk of industry and externality is composed of legal environment, relevant economic policy and natural environment.

Chapter 4 consists of four sections, a brief introduction to $R = P \times C$ and PCA, case background, data and execution, and outcome and analysis. This chapter regards CSL which is a well-known maritime logistics provider in China as a research case and lists seventeen disputes in detail. It attempts to combine quantitative with qualitative methodology to find out how to handle risk management for CSL in terms of WRP.

Chapter 5 is the conclusion and outlook. It explains the research contribution to WRP. It could be applied for reference by maritime logistics enterprises to preclude and control risks.

1.5 Summary

Chapter 1 has illustrated the background, meaning and purpose of the research.

Finance logistics has become much more acceptable to Chinese and foreign logistics companies than ever before. Finance logistics has foregone other traditional logistics businesses. On the other hand, as a core finance logistics business, WRP has been broadly recognized as the representative business model between logistics business and financial business. It also introduces past research about finance logistics and WRP in Chinese and international academic study respectively. Based on a comprehensive survey of past research, it puts forward the innovative points of the dissertation. At the end of this chapter，the outline of the dissertation and summary of each chapter are described.

Chapter 2 Illustration of finance logistics and WRP

2.1 Description and development of finance logistics

2.1.1 General description of finance logistics

Finance logistics is still a new business model in the logistics market. In China, for most of the domestic enterprises, it is a fresh concept.

In a broad sense, finance logistics is a comprehensive service platform, including SMEs' credit integration and restructure, logistics distribution, e-business and conventional commerce, by mainly taking SMEs as clients and storing flow goods as the foundation. Such new kind of finance service belongs to one of the finance derivative instruments called finance logistics business instead of traditional mortgage loan or inventory financing. It has gradually changed the relation of liability and right between the bank and the enterprise applying for a loan during the course of a traditional finance loan, and it is also different from the perspective of the three party relationship of warrantor bearing joint compensation liability in the course of a guaranteed loan. It relies on third party logistics enterprises more and more, mainly reflected in the management and service of logistics enterprises, so as to form close cooperative relationship among banks, logistics enterprises and loan enterprises.

In a narrow sense, the finance logistics business is a comprehensive bank service mainly for SMEs that lack fixed assets for mortgage. It is the result of combining logistics service with financial service, including logistics service with a financial service function. Services mainly encompass logistics, distribution processing,

financing, evaluation, supervision, disposition of resources and financial consultation.

Finance logistics is the combined product of logistics services and financial services. The third-party logistics enterprises offer integrated innovative services of finance and logistics, which encompass logistics, flow processing, financing, evaluation, monitoring, asset management, and financial advice. Finance logistics could enhance the overall supply chain performance and capital efficiency for customer service in addition to providing high value-added logistics and processing service.

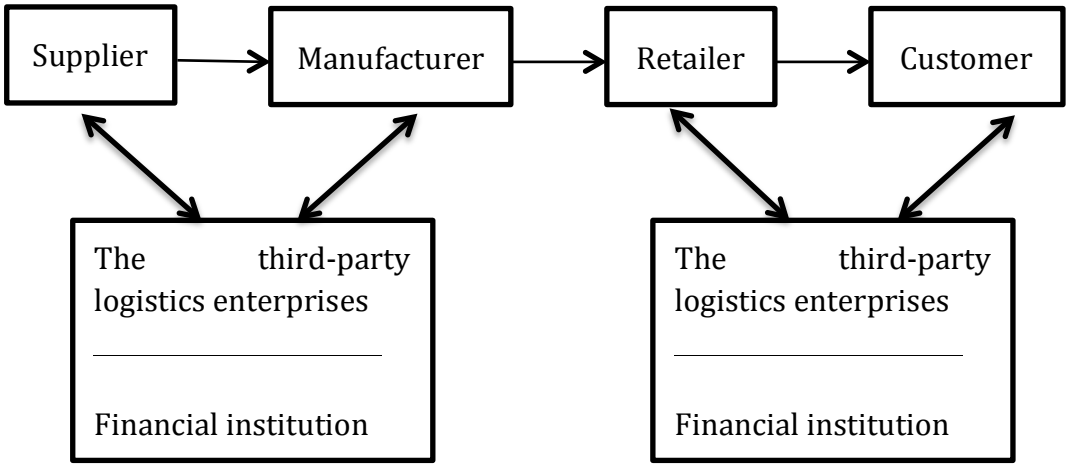

Figure 2 - Finance logistics system

Figure 2 shows how third-party logistics enterprises intimately collaborate with financial institutions for the provision of logistics services under the concept of integration between finance and logistics.

2.1.2 Business model of finance logistics

Currently, the most popular mode for finance logistics, which is widely accepted by

logistics providers and banks, is FTW (Finance, Transportation, Warehouse) mode. Today, more and more commercial banks and logistics enterprises are active in finance logistics. Financing difficulties of SMEs widely exist, but through finance logistics services, cooperation between banks and logistics enterprises is prompted to develop strong points. They can provide flexible logistics finance services to SMEs, such as FTW. However, in carrying out extensive finance logistics business, more and more problems appear in front of the players. One urgent problem to be solved is how to determine the loan rate and the loan discount rate of finance logistics service. But the current research is mainly based on the qualitative aspects of logistics finance functions, operation modes and risk factors. Quantitative analysis of benefits distribution among players is seen rarely. Starting from FTW, this research tries to analyze profit distribution problems of finance logistics service. At the same time, it explores cooperation agreements, which can increase the benefit of both parties.

FTW is a comprehensive logistics service platform and is comprised of pledge warehouse, value evaluation, logistics distribution and public auction. It not only constructs a new bridge between banks and financing enterprises, but also becomes an important third-party logistics service to SMEs. A simple model of FTW is shown in Figure 3.

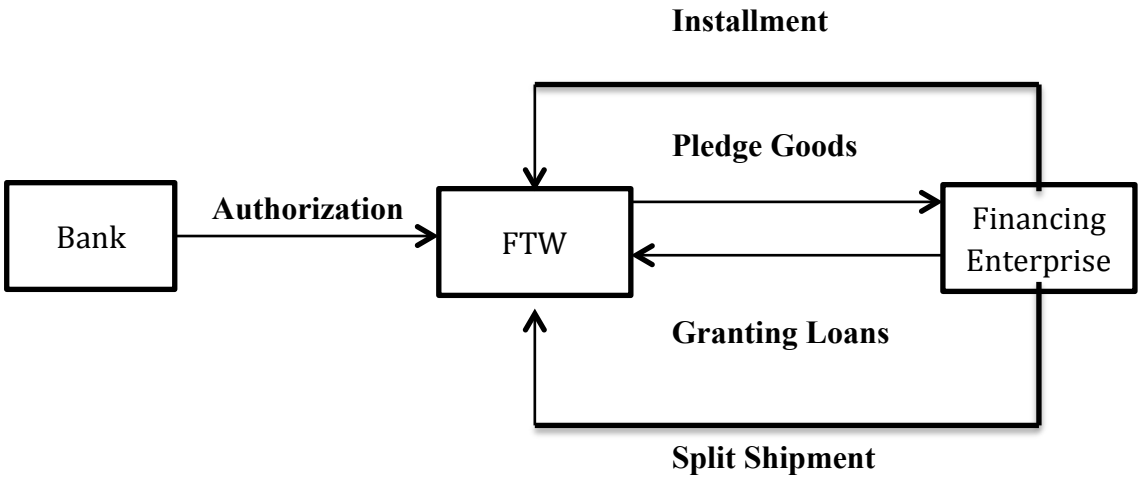

Figure 3 - Business process of FTW

Apart from FTW service, maritime logistics companies also offer another two different kinds of pledge businesses.

1) Dynamic pledge. During the process of pledge, according to the promissory, the pledged goods can be made by various arrangements, such as pledge, float, value-keeping management and "depositing new pledge, releasing the previous" pledge mode. The category and model of the pledged goods can be divided into restricted and non-restricted types according to the requirement.

2) Static pledge. During the process of pledge, the pledged goods are sealed up for safe-keeping until the loan is discharged.

2.1.3 Advanced mode of finance logistics

In recent years, finance logistics business has gradually become mature and professional for third-party logistics enterprises and financing institutions respectively. A more advanced finance logistics business model could appear, which

is defined as supply chain finance. Although it has been partially adopted and fostered by some logistics companies, supply chain finance is still in its infancy stage. Nevertheless, supply chain finance could promote more intimate cooperation between logistics providers and financing institutions in the foreseeable future. The business principle of supply chain finance is demonstrated in Figure 4.

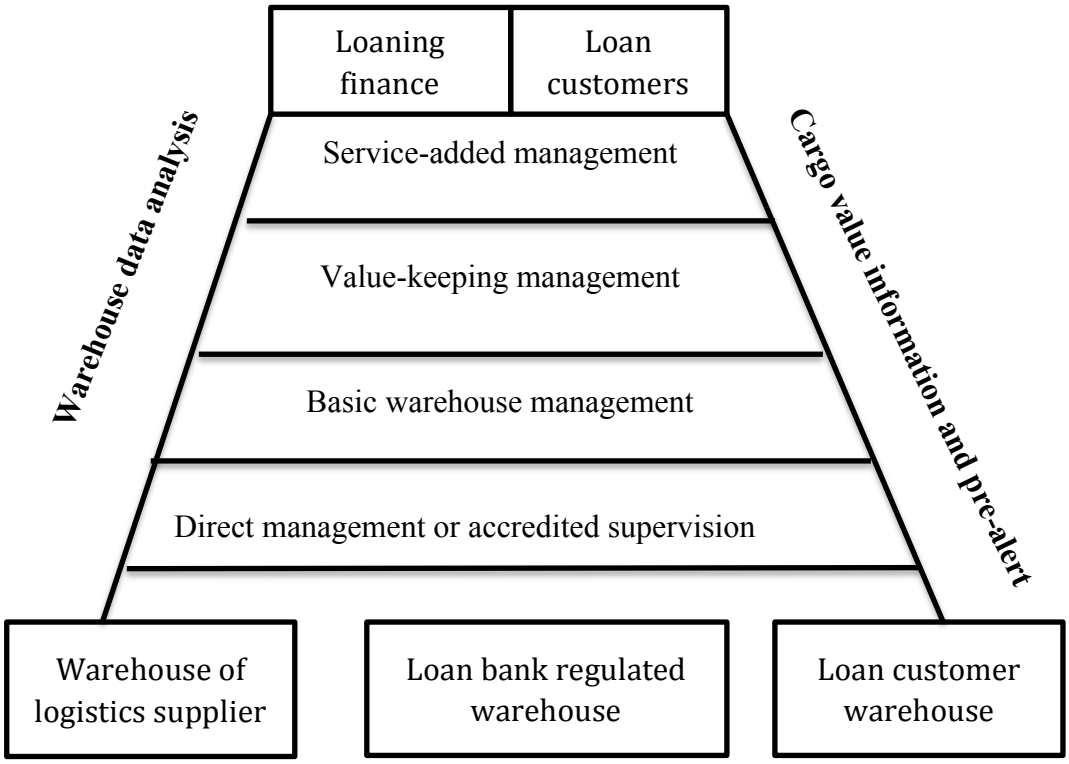

Figure 4 - Supply chain finance management system

As Figure 4 shows, the supply chain finance management system is composed of four various modules besides conventional direct management or accredited supervision.

1) Basic warehouse management. The basic operation module has the function of information reporting, including the inbound and outbound activity of warehousing management, inventory, and checking (storage location). It is the

base of operation of the support system.

2) Value-keeping management module. The core safety of supply chain finance management is capital safety. Thus, the pledge safety management module encompasses cargo category management, inventory value management and real time assessment management. It should be helpful to improve storage safety, pledge safety and capital safety.
3) Service-added management module. This is the interface operation module which can connect the loan financing institutions and the loan customers including the loan finance institution's instructions, loan customer's instructions, and pledge management demand instructions. The operation of the whole business can be automatic with the systematization of the supply chain finance management system, basic operation instructions, inbound and outbound restrictions and release management instructions, which are used for loaning banks and loan customers.
4) Pre-alert system of inventory value and warehousing data supporting module. Under the help of information management and service support system, this module provides the pre-alert report of inventory value, logistics instructions and information sharing functions.

2.2 Definition and legal basis of WRP

2.2.1 Definition of WRP

WRP is an active financial product which pledges warehouse receipt rights by way of transferring warehouse receipts to third-party in order to acquire loan from commercial bank. (Yang et al, 2008). From another point of view, WRP is one finance logistics business which integrates cargo flow, information flow and capital

flow as a whole management system. It is an innovative mode with inter-related logistics, information and finance and is executed under the supervision of third-party logistics companies.

The loan of WRP denotes that SMEs store pledged goods in a warehouse supervised by a third-party logistics company and applying for a mortgage from a commercial bank in the light of the issued warehouse receipt. Commercial banks grant loan amounts with an appropriate proportion valued by pledged goods and entrust third-party logistics companies to look after pledged goods and pay the corresponding remuneration. During the cooperation with the commercial bank, the third-party logistics company plays the role of custodian to supervise the collateral. Whereas with the cooperation with SMEs, the third-party logistics company becomes a strategic business partner who can provide supervisory service besides elementary logistics services, such as raw material procurement, transportation and storage. It could not only offer fully integrated logistics services to SMEs, but also solve financing bottlenecks for SMEs. Therefore, WRP business could successfully implement the organic combination of logistics, trade flow, information flow, and capital flow apart from simply enhancing the logistics services itself.

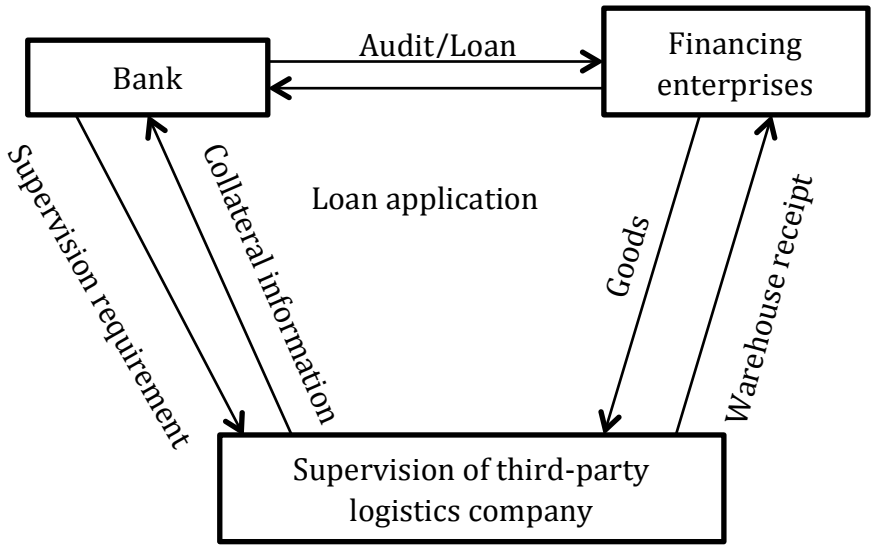

Figure 5 - Loaning mode of warehouse receipt

2.2.2 Statutory status of warehouse receipt

In China, contract law has regulated that if a depositor hands over warehousing goods to a custodian, the custodian should pay the warehouse receipt. Thus, it is easily known that the warehouse receipt is a security. Therefore, the warehouse receipt should possess the following characteristics:.

- The warehouse receipt is a property security, as well as a debt security. Property security is the security which regards the property as content of security right. The warehouse receipt is the proof to draw warehousing goods, as well as exclusive proof. Nevertheless, an invoice cannot act as proof of property; it is only the record of business taking place. As long as a depositor has acquired a warehouse receipt, it signifies that the depositor has obtained property of warehousing goods and independent right of the real claim. As a result, warehouse receipt is property security. Debt securities are understandable based on the perspective of the warehouse company. When a warehouse company takes

over the goods from a depositor, it should issue a warehouse receipt. The warehouse company is obligated to repay the pledged goods which could be deemed as an obligatory right. Hence, it is named as debt security.

- The warehouse receipt is To-securities because the layout of the warehouse receipt is required sternly by law. The substance of the warehouse receipt must be recorded and strictly identical to law. It is regulated in contract law that a warehouse receipt should encompass the following contents.

1) The name and address of depositor
2) The breed, quantity, quality, package, mark of warehousing goods
3) The loss standard of warehousing goods
4) The site of storage
5) The duration of storage
6) The warehousing fee
7) The amount of money and duration of insurance and the name of underwriter

- The Warehouse receipt is an endorsement security. It is stated in Chinese contract law, holder of warehouse receipt can transfer the right of drawing warehoused goods when the warehouse receipt has been endorsed and signed or sealed by custodian. Normally, it is endorsement to order for the purpose of efficiently finding the liable person when a legal dispute occurs.
- The warehouse receipt is an inscribed security. Inscribed securities should specify the name of obligee, date and place. This can be performed exclusively by the specified obligee. In Chinese contract law, a warehouse receipt must specify the name and address of the depositor. Therefore, a warehouse receipt is an inscribed security. It could be an endorsement to order if it is needed to be transferable.
- The warehouse receipt is a literal note. Literal note means that the right and obligation of securities is only determined by the context recorded on the

securities. The right and obligation of a warehouse receipt is determined by the context recorded on the warehouse receipt. It is concretely illustrated on the back of the warehouse receipt and cannot be altered by additional recognized factors except the specification of the warehouse receipt. Accordingly, the warehouse receipt is a literal note.

2.2.3 Legal relation of tripartite

It is worthwhile to study the bilateral relation amongst the tripartite which is the financing enterprise, commercial bank and third-party logistics enterprise because there are many legal relations existed bilaterally and trilaterally (Biederman, 2004; Hoffman, 2005). The typical legal relationships consist of five various types.

1) Warehousing legal relation. The financing enterprise signs a warehouse contract with the third-party logistics enterprise in accordance with the requirements of the commercial bank to store the pledged goods which are under the custody of the third-party logistics enterprise. The custodian signs and issues a warehouse receipt to the depositor on behalf of the third-party logistics enterprise and undertakes the obligation of custody of the goods which are listed in the warehouse receipt. As a result, a warehousing legal relationship has been set up between the depositor and third-party logistics enterprise.
2) Financing legal relation. The financing enterprise asks for a loan from a commercial bank after having carried out WRP business with a third-party logistics enterprise. When it is ratified by the commercial bank, both of them will sign a loan contract. So a financing legal relationship has been erected between the commercial bank and financing enterprise.
3) Pledge legal relation. The depositor as financing enterprise signs a WRP contract with a bank to collateralize the warehouse receipt dedicated to fulfilling the

obligation of repayment. Otherwise, the commercial bank can take the pledged goods. Thus, a pledge legal relationship has been formed between the depositor and commercial bank.

4) Commission legal relation. Pledged goods should be exclusively stored in a warehouse designated by the commercial bank. The commercial bank will inspect the capability of the third-party logistics enterprise prior to selecting a business partner. There is a WRP commission contract signed bilaterally. The third-party logistics enterprise supervises the pledged goods and flow of the goods entrusted by the commercial bank. At the same time, the third-party logistics enterprise offers value-added service, such as evaluation of pledged goods. Correspondingly, a commission legal relationship has been formed between the commercial bank and third-party logistics enterprise.
5) Supervision legal relation. A supervision contract is concluded by the tripartite: the financing enterprise, commercial bank and third-party logistics enterprise. It virtually encompasses a warehousing contract and part of a financing contract because a WRP should be accomplished through the collaboration of the tripartite. In fact, a tripartite legal relationship is defined during the WRP business process.

2.3 Operational process of WRP

There are three different kinds of business service under the definition of finance logistics. They are WRP, chattel mortgage, and FTW which has been discussed in chapter 1. Among them, WRP is the typical business model in finance logistics. WRP should be conducted by the collaboration of three parties; each of whom could suffer a loss if breach of contract happens. Therefore, the operational process of WRP could be classified by two categories: breach and non-breach.

2.3.1 Operational process under the condition of non-breach of contract

Non-breach of contract means that the financing enterprise can repay the loan to the commercial bank on schedule in light of the requirements in the contract and withdraw the pledged goods from the third-party logistics enterprise. Figure 6 shows the concrete operational flow.

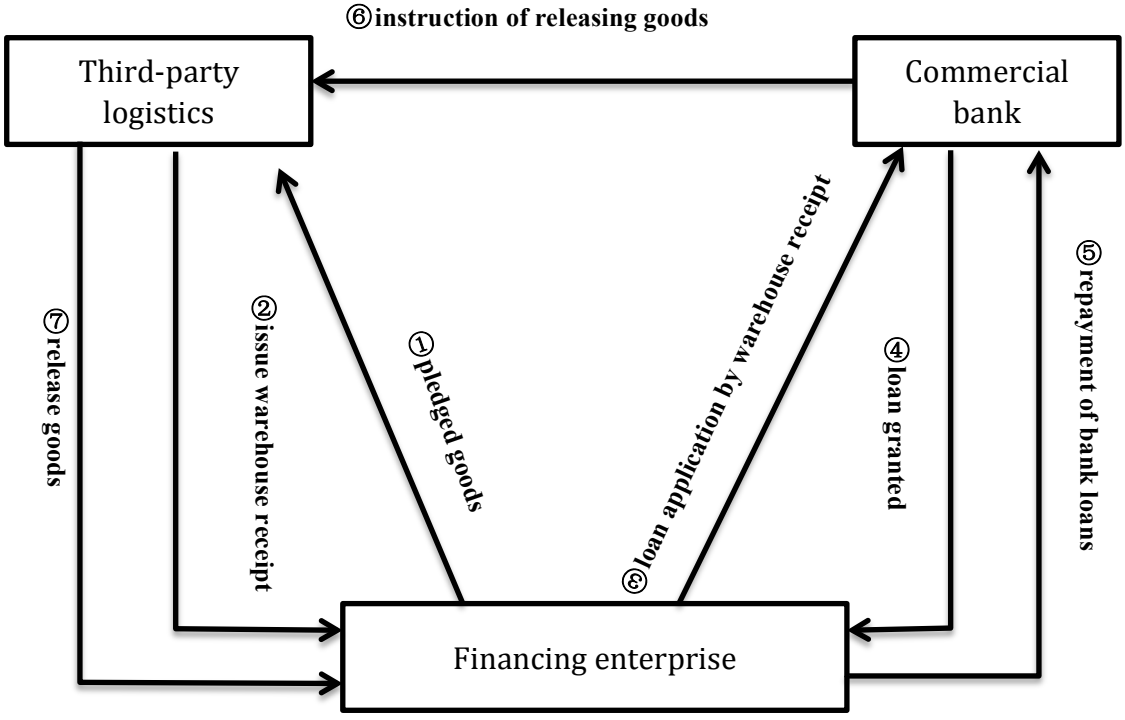

Figure 6 - Operational flow under the condition of non-breach of contract

- Step 1, Third-party logistics enterprise signs warehouse custody contract with financing enterprise who is responsible for the transportation of pledged goods to a warehouse designated by the third-party logistics enterprise.
- Step 2, Third-party logistics enterprise verifies the pledged goods and issues warehouse receipt after audit.

- Step 3, Financing enterprise submits corresponding documents to apply for the pledge loan from a commercial bank. The commercial bank will check the warehouse receipt to reduce the risks.
- Step 4, Tripartite signs the cooperative agreement of WRP after the commercial banks has accepted. Simultaneously, financing enterprise and commercial bank will affix their signatures in the endorsement column on the warehouse receipt and conclude the agreement of account supervision. After having finalized all legal procedures, the commercial bank grants a certain amount of loan to the financing enterprise.
- Step 5, The financing amount will credit in the supervised account when normal sale of financing enterprise is implemented in financing duration.
- Step 6, Commercial bank issues a separate warehouse receipt to the financing enterprise based on the amount in the supervised account and instructs the third-party logistics enterprise to release a corresponding amount of goods.
- Step 7, Third-party logistics enterprise returns the pledged goods to the financing enterprise in accordance with the instruction of the commercial bank. The rights and obligations of the tripartite have been terminated and the business of the WRP has been finalized.

2.3.2 Operational process under the condition of breach of contract

Breach of contract occurs when the financing enterprise breaks the contract and fails to fulfill the obligation in the contract to repay the loan on schedule to the commercial bank. The pledged goods are withdrawn by the commercial bank. The concrete operational flow is as follows.

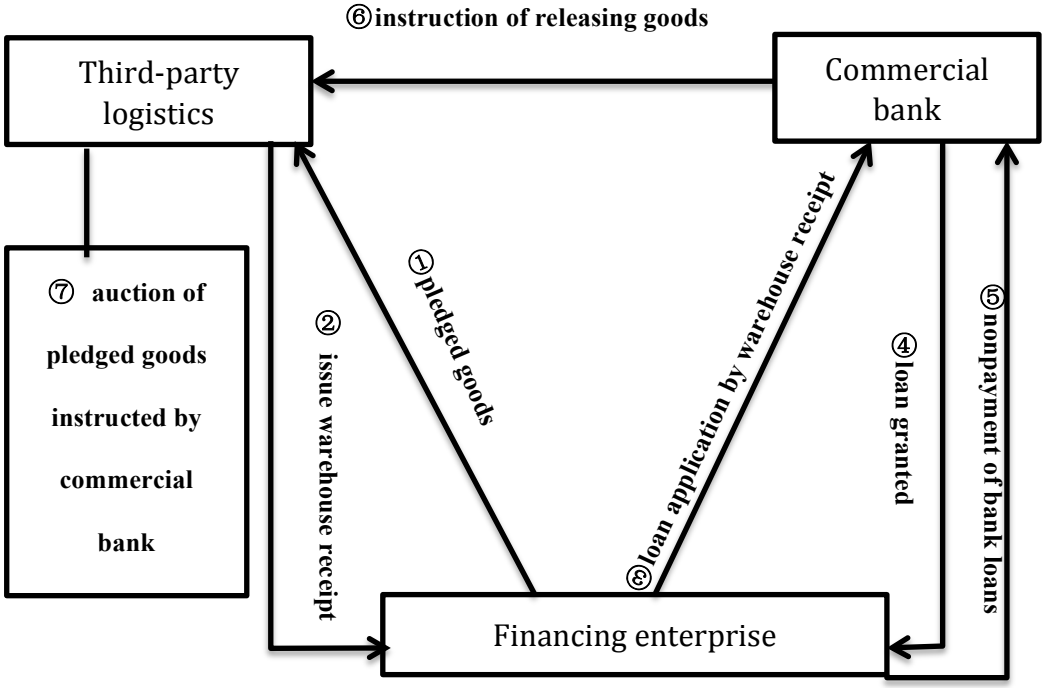

Figure 7 - Operational flow under the condition of breach of contract

From step 1 to step 4, the operation flow under the condition of breach of contract is identical to non-breach of contract. However, they are different from step 5 to step 7 as mentioned below.

- Step 5, Financing enterprise fails to credit the supervision account and does not realize the normal sale or defaults deliberately.
- Step 6, Commercial bank instructs the third-party logistics enterprise to hand over the pledged goods.
- Step 7, Third-party logistics enterprise takes action of auction, sale or counter purchase to clear off obligatory rights according to instruction from the commercial bank.

Compared with non-breach of contract, the difference is embodied at the time when the financing enterprise is not capable of repaying the loan on schedule and the

commercial bank is authorized to claim the pledged goods by itself or asks the third-party logistics enterprise to reimburse the loss which was brought by the default of the financing enterprise.

2.4 Positive effect generated by WRP

WRP combines the SMEs' movable asset flow, warehousing managerial activity and loan financing of the commercial bank. It could bring considerable economic benefit to the tripartite.

Firstly, it could generate a positive effect for the financing enterprise. WRP could help SMEs pledge movable assets to acquire loans from commercial banks instead of collateralizing fixed assets. Normally, fixed assets accounts for 30% total assets of SMEs and the remaining 70% is movable assets. It could contribute to attain financial support and make inventory be an asset for SMEs. It could speed up the turnover of inventory and provide additional capital for SMEs. Furthermore, it could also help SMEs purchase a great deal of raw material to decrease production costs and establish good cooperative relations with financial institutions.

Secondly, WRP could bring positive effects for third-party logistics enterprises. As an intermediary, the third-party logistics enterprise offers custodial services for warehoused goods, supervision services for pledged goods and helps financial institutions explore financing business with low-degree of risk after having signed service agreements with commercial banks and financing enterprises respectively. It is helpful for third-party logistics enterprises to produce economic profit and erect stable business relations with the other two parties. By cooperation with financial institutions and SMEs, third-party logistics enterprises could extend their traditional

logistics service chain and enhance their competitive edge.

Thirdly, it could also be advantageous to financial institutions. The most critical effect brought by WRP to commercial banks is the reduction of risk when they lend money to SMEs. Third-party logistics enterprises would help commercial banks by pledging movable assets and supervising pledged goods on behalf of commercial banks. On the other hand, commercial banks would broaden their financial business to increase income from movable asset pledges in addition to fixed asset pledges.

Finally, WRP could help social capital flow and establish a credit system. Basically, the pledged goods are movable. Financing enterprises should replenish pledged goods according to instructions from commercial banks when they withdraw pledged goods. As a result, it will not hamper the free flow of pledged goods. In addition, the warehouse receipt acts as intermediary and the commercial bank lends money to financing enterprise in the form of bill of exchange and electronic cheque. Therefore, WRP will contribute to providing buffering action to the social capital flow and set up a social credit system.

WRP plays a vital role in increasing capital turnover efficiency and contributes to facilitate trade circulation and industrial structure optimization.

2.5 Summary

Chapter 2 not only describes the general idea and development of finance logistics, but also introduces FTW as a finance logistics business modality. As a core business modality, WRP has become much more developed in China than before. The tripartite which is composed of financing enterprise, commercial bank and

third-party logistics enterprise has reached common sense to accept WRP business. It defines the nature of WRP as well as the legal relations amongst the tripartite to demonstrate the sustainability and legitimacy of WRP. It categorizes the operational process of WRP as non-breach of contract and breach of contract. At the same time, each operational step has been explained in detail and the difference between non-breach of contract and breach of contract has been explained. The final part of chapter 2 mentions positive effects which are generated by WRP from each party's perspective.

Chapter 3 Interpretation of different risks on WRP

WRP is a newly emerged value-added logistics service. For the sake of its relation with finance, third-party logistics companies have dual liabilities like supervision and custody. Thanks to the standpoint of intermediary between commercial bank and pledger, the commercial bank transfers not only the responsibilities of supervision and custody, but also the risks of the pledged loan to the third-party logistics company. Therefore, logistics companies have to bear a certain amount of risk provided they intend to cultivate WRP business.

On the other hand, once maritime logistics enterprises have set up business relations with commercial banks and pledgers, they would be delighted to extend the simple WRP business to upstream and downstream sections, such as raw material procurement and pledged goods logistics services. Thus, besides the risk of WRP, third-party logistics companies should pay serious attention to the risks originated from the upstream and downstream sections. It is definitely correlated to the classic logistics business which would be aggravated. In China, due to the insufficiency of regulations to develop WRP, it has provoked some risk factors to the maritime logistics companies.

3.1 Risk of pledged goods

- Option of pledged goods. Tremendous risks will result if maritime logistics companies choose inappropriate goods to be pledged. In the business chain of WRP, maritime logistics companies face principal risks because commercial banks have transferred risk to maritime logistics providers by the trilateral contract. Nevertheless, commercial banks, instead of maritime logistics providers, have the right to opt for pledgers. Furthermore, commercial banks

decide the key operational processes. Maritime logistics companies just simply follow the instructions of commercial banks for the purpose of being cooperative. Despite the fact that the commercial bank is the decision-maker on choice of pledgers, maritime logistics companies still can collaborate with commercial banks because both of them possess the same purpose: to select target customers with high credit. Ordinarily, the pledged goods could be categorized by ranks such as priority, prudence, restriction and forbidden. Table 2 shows the category of relevant pledged goods.

Table 2 - Category of pledged goods

Relevant pledged goods	Rank	Example
Raw materials, strategic materials, bulk materials, primary commodities, important semi-finished product	Priority	Steel, coal, common plastics materials
Terminal consumer goods, rapidly innovative product	Prudence	Electronic product
Strongly substituted product, non-standard product, restrictively circulated product, uneasily liquidated product	Restriction	Decoration product
Forbidden circulated product by the government	Forbidden	Military weapon, drug

- Market price stability of pledged goods. Pledged goods should be sold in a specific market; otherwise, the commercial bank will not permit the pledger to

conduct WRP business. Nevertheless, market price will result in the price of pledged goods floating. When the price declines, the value of pledged goods will shrink accordingly. The price fluctuation of the pledged goods could bring risk to the pledged loan.

- Quality of pledged goods. The quality of pledged goods is a vital indicator verified in WRP business. If the quality problem has taken place during the period of pledge business, it will directly cause the worthless declaration and loss of the pledged goods. Hence, the quality of pledged goods could arouse risk for the maritime logistics provider.

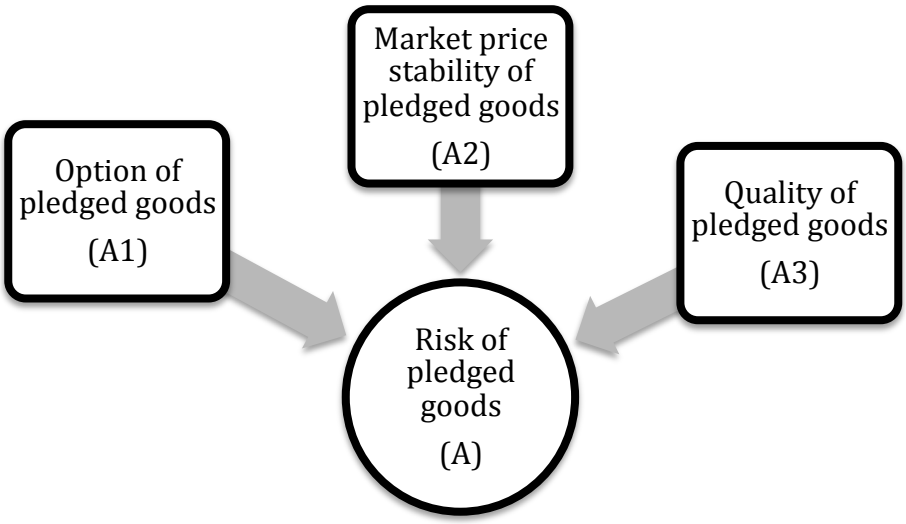

Figure 8 - Category of risk of pledged goods

3.2 Risk of various techniques

Risk of various techniques originates from unfamiliarity when WRP business came out a decade ago. For the purpose of becoming a mature business product, maritime logistics providers should develop and rely on corresponding techniques to assure the security of pledge business. These techniques might include custodian technique,

assessment capability, information system. Adversely, the mature techniques could contribute to improve the operational capability of the maritime logistics provider.

- Custodian technique of WRP. The logistics company is the proxy of the commercial bank and responsible for the custody of pledged goods. During the period of pledge, the commercial bank is normally in charge of the authenticity and legality of the pledged goods, whereas the logistics company takes liability for the quantity and quality of pledged goods and undertakes the loss, quality change and so on. In order to achieve the acknowledgement from the commercial bank and pledger, the maritime logistics company must create a rigorous and efficient business process to enhance their competitive edge in WRP business. The custodian technique includes spot management, information management, risk management, contingency management and business flow management.
- Assessment capability technique of pledged goods. Currently, the assessment of pledged goods should be afforded by commercial bank. However, it is not expert in assessing pledged goods; therefore, the commercial bank commits the assessment to the maritime logistics company. For the sake of security, the commercial bank is more likely to opt for an independent assessing institution to assess pledged goods and transfers the risk to the maritime logistics company accordingly. The value of pledged goods depends on the fair price in the specific market and is floated in terms of market price. If there have no fair price of pledged goods, an accounting engineer would be invited by the assessing institution to account for a reasonable price.
- Information system for WRP. Information system for WRP is not independent in the majority of logistics companies. Normally, it subordinates to the overall warehouse management system. The main purpose of the WRP system is to monitor the quantity of pledged goods and keep it under control, not less than limitation set. Due to the possibility of a manual operational mistake and data

loss, some risks are inherent.

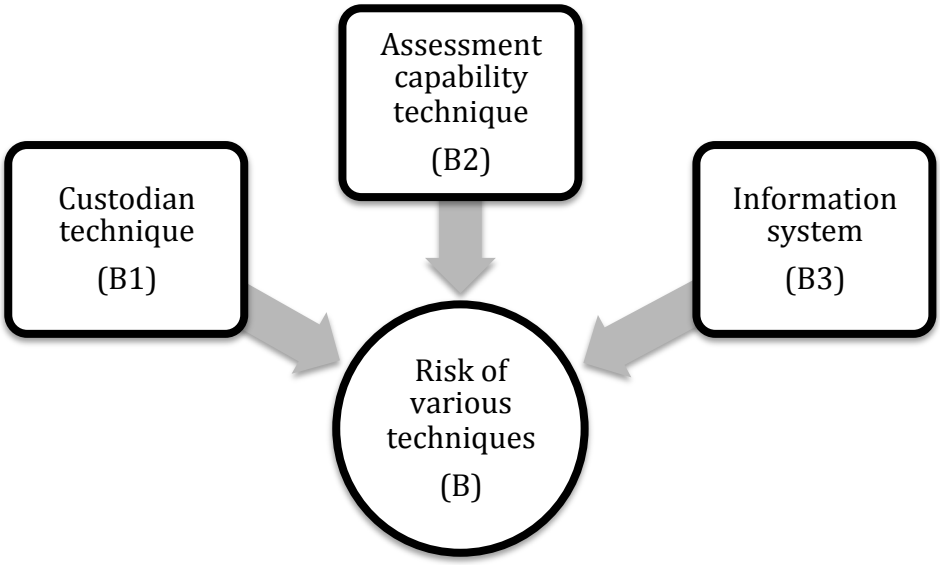

Figure 9 - Category of risk of various techniques

3.3 Risk of business operation and supervision

WRP business is quite new to maritime logistics companies, so the companies should adjust their business processes so as to coincide with WRP business. Otherwise, it will definitely influence the healthy development of WRP. Thereafter, there are several points that should be taken into account.

- Business condition of maritime logistics company. Maritime logistics providers will not simply focus on WRP itself as mentioned before. They will try their best to prolong the logistics service chain to offer diversified services centered on WRP to the pledger. If they are capable of integrating various logistics services in good condition, they could form perfectly a platform to a logistics chain and finance chain for the pledger. If not, maritime logistics providers could plunge into mud and reduce their solvency capability. Furthermore, the WRP business

would be more vulnerable to collapse.

- The facility and regulation of safety management. The facility used for safety will influence the healthy development of WRP. For example, if the facility has been assembled with a monitoring system to decrease the risk of burglary in the warehouse, the commercial bank would take it into account as a key element to collaborate. On the other hand, the regulation of safety management would be essential to WRP in the event of coincidental accident.
- Warehouse supervision. There is a high likelihood of damage when pledged goods are moved in and out of the warehouse or loaded and unloaded. So keeping pledged goods in perfect condition becomes an important physical risk indicator. At the same time, if the pledged good is raw material or strategic material, the maritime logistics company would like to store it in another warehouse which must be out-sourced, or the pledger's warehouse for the reason of saving transport cost. Accordingly, it could result in risk to reliable supervision in other warehouses.

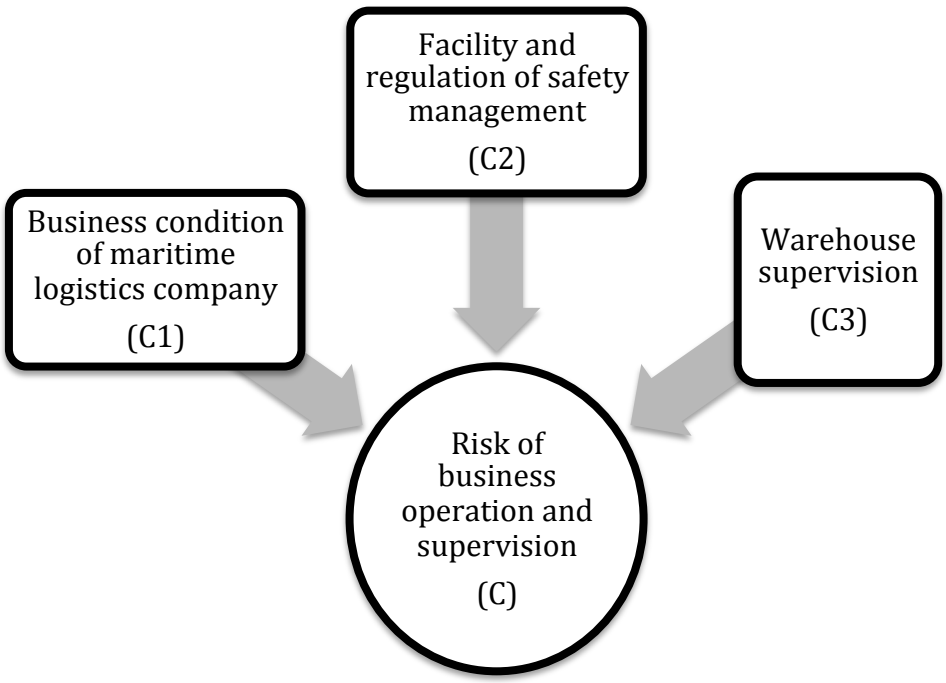

Figure 10 - Category of risk of business operation and supervision

3.4 Risk of customer credit

Customer credit and rank should be considered from the angle of the pledger's self-management capability and credit history.

- Profitability of pledger is key to the security of loaned capital.
- Solvency capability of pledger is intimately connected with the operational and profitable capability of the maritime logistics company. It should be embodied in the economic power and financial situation of the pledger.
- Customer credit record. The pledger's credit record is an important dossier for the maritime logistics company. If the pledger is of highly ranked credit, the pledger should be accepted easily by the maritime logistics company as well as commercial bank.

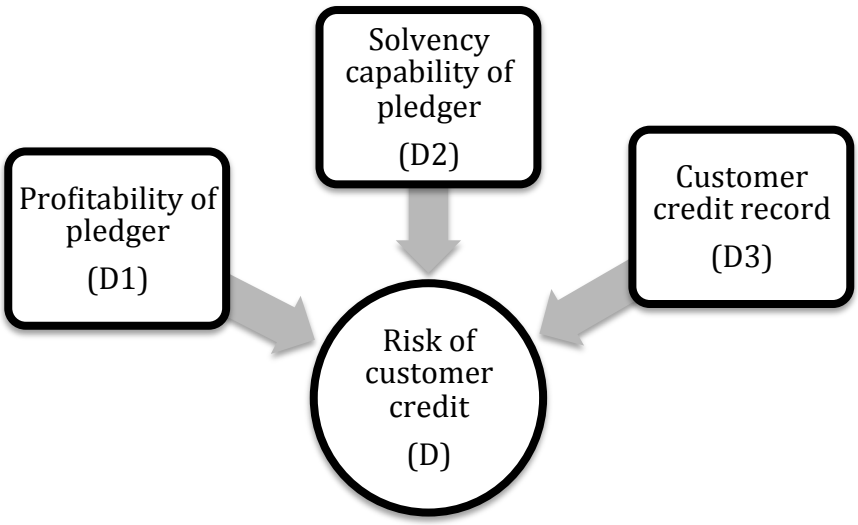

Figure 11 - Category of risk of customer credit

3.5 Risk of industry and externality

- Legal environment. The law and regulation corresponding with WRP has not been established carefully in China until now. In order to secure its risk, a maritime logistics company should manage pledge business seriously. In practice, warehouse receipts should be regarded as valuable securities, but thanks to defects in the corresponding law and regulation, legal disputes could probably take place in terms of warehouse receipt separation, warehouse receipt replacement, warehouse receipt value compensation and WRP right transfer. As a result, the legal environment could promote the development of WRP business.
- Relevant economic policy. Government policy could enhance transport efficiency and consolidate the market order. Favorable economic policy could play a positive role in the development of modern logistics business.
- Natural environment. A pledger should be required to insure the pledged goods in the event of loss caused by natural disaster like rain storm or earthquake.

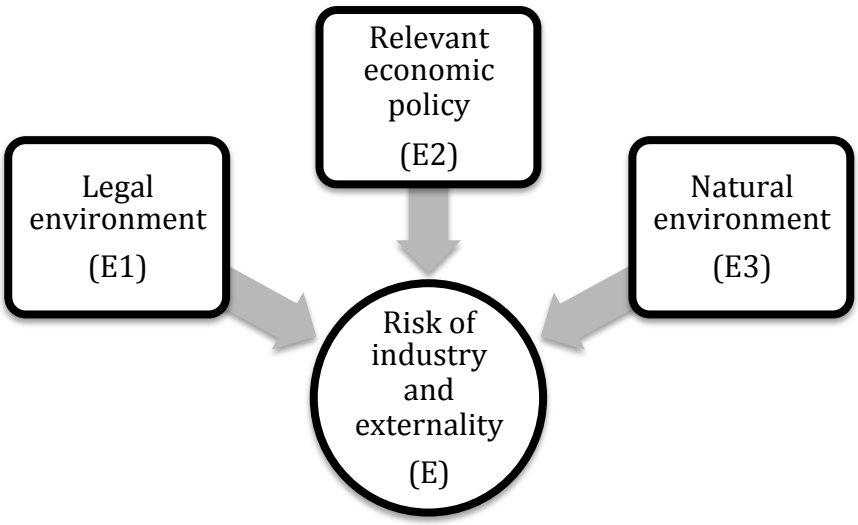

Figure 12 - Category of risk of industry and externality

3.6 Summary

Based on the previous anatomy of business modality of WRP, a significant number of risk factors have been identified during its business process from the perspective of the maritime logistics provider. Some risk factors stem from WRP itself, some others are due to the upstream and downstream extension of WRP. These risk factors have been categorized by five different types, which are risk of pledged goods, risk of various techniques, risk of business operation and supervision, risk of customer credit, risk of industry and externality.

Chapter 4 Case study

4.1 Brief introduction of $R = P \times C$ methodology and PCA

4.1.1 Introduction of $R = P \times C$ methodology

Risk assessment represents an evaluation of the likelihood and severity of a known or potential hazard (Hathaway, 1997). Risk is the function of the probability (P) of loss and the significance of its consequences (Manuj & Mentzer, 2008). The level of risk for each threat is determined by finding the likelihood or the probability of occurrence and considering its consequences. The level of risk associated with the hazard is established mathematically as follows:

$$R = P \times C \tag{1}$$

where $R = level\ of\ risk$

$P = probability\ or\ likelihood\ of\ occurrence$

$C = consequences$

It can also be conventionally expressed as:

$$Level\ of\ Risk = Likelihood \times Consequence$$

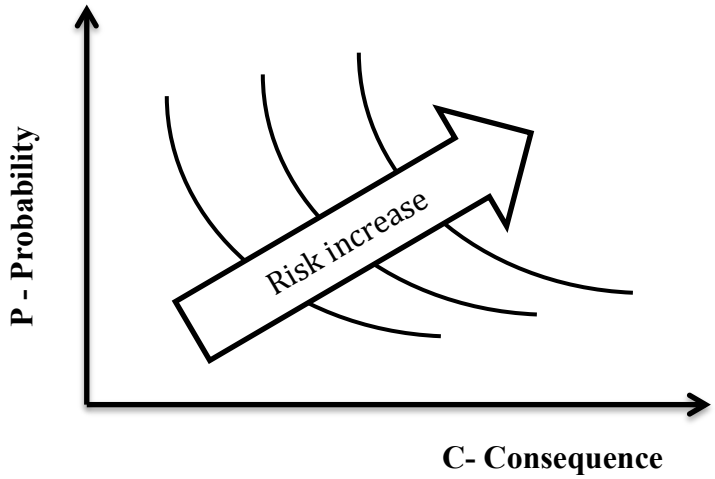

Figure 13 - Graph of $R = P \times C$

The analysis is based on a broad perspective on risk, as defined by Aven and Renn (2009). According to this perspective, risk equals probability and severity of consequences of an activity with respect to something. In line with this risk perspective, risk can be formalized as (C, P), where C represents the consequences (or the severity of the consequences) and P represents the uncertainty about what value C will take. Probability and consequence are adversely affected. Below the curve, the level of risk is acceptable, while above the curve, the level of risk becomes unacceptable.

4.1.2 Introduction of Principal Component Analysis

In a particular disputable case, several risk factors could trigger a dispute instead of one risk. As a result, Principal Component Analysis is an appropriate methodology to help find out the weight of each risk factor in a particular disputable case.

Generally, the principal components are ordered in such a way that the first component explains most of the variance in the data, and each subsequent one accounts for the largest proportion of variability that has not been accounted for by its predecessors (Abdul-Wahab et al, 2005; Skrbic & Đurisic-Mladenovic, 2007; Sousa et al, 2007; Viana t al, 2006). In order to clarify the influence of each original variable in the PCs, a rotational algorithm such as varimax rotation is usually determined to obtain the rotated factor loadings that represent the contribution of each variable to a specific principal component. Varimax rotation could ensure that each variable is maximally correlated with only one principal component and a near zero association with the other components (Statheropoulos, 1998).

The main results of PCA are factor loadings, which reflect how much the variable contributes to that particular PC and how well one variable is similar with others. The higher the loading of a variable, the more that the variable contributed to the variation accounted for by the particular PC. A PC with an eigenvalue greater than or equal to 1 is usually considered as being of statistical significance (Yidana et al, 2008). The data sets were analyzed by PCA using commercial software SPSS 18 in this study.

Pearson (1901) and Hotelling (1993) initially developed PCA to explain the structure of variance-covariance by way of the linear combinations of each quality characteristic. The mathematical procedure of PCA could be described as follows (Fung & Kang, 2005).

1. The original multiple quality characteristic array

$$x_i(j), i = 1,2,\cdots,m; j = 1,2,\cdots,n \quad (2)$$

$$X = \begin{bmatrix} x_1(1) & \cdots & x_1(n) \\ \vdots & \ddots & \vdots \\ x_m(1) & \cdots & x_m(n) \end{bmatrix} \quad (3)$$

where m is the number of experiment and n is the number of the quality characteristic.

2. Correlation coefficient array

The correlation coefficient array is evaluated as follows:

$$R_{jl} = \left(\frac{Cov(x_i(j), x_i(l))}{\sigma_{x_i}(j) \times \sigma_{x_i}(l)} \right), \qquad j = 1,2,\cdots,n, \qquad l = 1,2,\cdots,n \quad (4)$$

where $Cov(x_i(j), x_i(l))$: the covariance of sequences $x_i(j)$ and $x_i(l)$; $\sigma_{x_i}(j)$: the standard deviation of sequence $x_i(j)$; $\sigma_{x_i}(l)$: the standard deviation of sequence $x_i(l)$.

3. Determining the eigenvalues and eigenvectors. The eigenvalues and eigenvectors are determined from the correlation coefficient array,

$$(R - \lambda_k I_m) V_{ik} = 0 \quad (5)$$

where λ_k eigenvalues, $\sum_{k-1}^{n} \lambda_k = n, k = 1,2,\cdots,n$; $V_{ik} = [a_{k1} a_{k2} \cdots a_{kn}]^T$: eigenvectors corresponding to the eigenvalue λ_k.

4. Principal components

The uncorrelated principal component is formulated as:

$$Y_{mk} = \sum_{i=1}^{n} x_m(i) \cdot V_{ik} \quad (6)$$

where Y_{m1} is called the first principal component, Y_{m2} is called the second principal component and so on.

The principal components are aligned in descending order with respect to variance, and therefore the first principal component Y_{m1} accounts for most variance in the data.

In this case study, PCA is applied to confirm the weight of each risk in each dispute. As Han (2012) stated, PCA could as well be applied in terms of limited amount of sample data (Jolliffe I. T., 2002). Meanwhile, A principal component analysis of a covariance matrix is equivalent to an analysis of a weighted correlation matrix, where the weight of each variable is equal to its variance. Variables with large weights tend to have larger loadings on the first component and smaller residual correlations than variables with small weights. SPSS is a useful statistics software to run PCA. Taking advantage of SPSS could help to analyze data better (Coakes & Sheridan, 2011).

4.2 Background of case

CSL is of high renown for its logistics business in China and was established in 2001 with registered capital of 92 million US dollars. Under the umbrella of CSL, there are eight regional subsidiary companies spread over the whole Chinese market and located in Dalian, Tianjin, Qingdao, Shanghai, Xiamen, Shenzhen, Haikou and Chongqing respectively.

Figure 14 – Areas related to CSL disputes in China

Apart from eight subsidiaries, hundreds of branch companies dot various cities in China in order to cater to different customers' logistics demands. The annual turnover of CSL amounts to 810 million US dollars, which should be encompassed by several logistics business models, such as forwarding, warehouse, engineering project, WRP, and multi-mode transport. In recent years, WRP has become one of the most important business models in CSL because of capital demand by SMEs. CSL has been a well-known intermediary between SMEs and commercial banks for the sake for its reliability and credibility. Meanwhile, CSL has acquired extraordinary latent logistics business opportunities due to WRP business. In addition, CSL has been devoting itself to expanding its overseas market and setting up cooperative business relations with its counterparts in different foreign countries. Table 3 lists a number of disputes that have taken place in CSL in recent years.

Table 3 - List of disputes

No.	Venue	Name of pledged goods	Amount of loss (Unit: USD)
1	Xinzhou, Shanxi province	Raw coal, clean coal	131,000
2	Changzhi, Shanxi province	Raw coal, clean coal	326,000
3	Xingtai, Shanxi province	Corn, corn starch	153,000
4	Tianjin	Deformed steel bars	245,000
5	Cangzhou, Hebei province	Deformed steel bars	202,000
6	Baotou, Inner Mongolia	Coal	196,000
7	Anyang, Henan province	Steel	82,000
8	Zhengzhou, Henan province	Corn	163,000
9	Anyang, Henan province	Silicon Manganese	163,000
10	Suzhou, Jiangsu province	Barley	65,000
11	Xinyu, Jiangxi province	Iron powder	147,000
12	Xiangyang, Hubei province	Tyres	98,000
13	Suzhou, Jiangsu province	Strip steel	98,000
14	Suzhou, Jiangsu province	Steel	326,000
15	Fuzhou, Fujian province	Steel	110,000
16	Fuzhou, Fujian province	Steel	261,000
17	Suzhou, Jiangsu province	Deformed steel bars	295,000

4.3 Data and execution

There are 17 disputes listed in detail including time, venue, name of pledged goods and amount of loss. Herewith, the amount of loss is the consequence of each dispute. Moreover, due to the difficulty to quantify risk factors, Expert Evaluation Method has been adopted to categorize the above-mentioned risk factors. Meanwhile, these five ranks correspond to the numbers 5, 4, 3, 2, 1 in the interval of $[1, 5]$. There are five relevant experts who are familiar with the WRP business invited to mark each risk factor. Each dispute might be caused by several risk factors. After having

conducted SPSS 18 in terms of the assessment of experts, the variance of each risk factor could be regarded as probability. E1, E2, E3, E4, E5 represent five experts respectively. Table 4 aggregates the details and outcomes of each dispute.

Table 4 - Details and outcomes of dispute

	Disputable cause	Expert assessment					Variance (Weight)	Loss of each risk (Unit: USD)
		E1	E2	E3	E4	E5		
Dispute 1	A2	4	4	3	4	5	45.12%	59,107
	B1	3	5	5	3	4	33.33%	43,662
	E2	3	4	4	5	4	21.55%	28,230
Dispute 2	A2	3	4	5	4	5	45.0%	146,700
	B2	4	5	3	3	3	28.77%	93,790
	C2	5	3	3	4	4	23.92%	77,979
	D3	5	4	5	3	4	2.30%	7,498
Dispute 3	B3	2	3	3	5	4	59.48%	91,004
	D3	5	5	4	4	5	33.33%	50,995
	E1	3	3	4	2	3	7.19%	11,000
Dispute 4	A2	4	4	5	5	5	48.97%	119,977
	B1	5	3	5	3	4	37.80%	92,610
	B3	2	3	2	4	3	12.20%	29,890
	E2	4	3	5	5	3	1.03%	2,524
Dispute 5	A2	4	4	5	5	5	56.27%	113,665
	B1	4	5	3	4	5	27.99%	56,540
	B3	3	2	2	4	3	12.61%	25,472
	E2	5	5	4	4	5	3.14%	6,343
Dispute 6	A1	5	5	4	5	4	55.50%	108,780
	B3	4	3	5	5	4	37.16%	72,834
	D2	4	4	5	5	3	6.58%	12,897
	D3	5	5	5	5	4	0.77%	1,509
Dispute 7	A2	5	4	5	5	5	55.60%	45,592
	D3	4	4	3	5	4	28.26%	23,173
	E1	4	3	3	3	5	15.63%	12,817
	E2	4	5	5	4	4	0.52%	426

Dispute 8	B3	2	2	3	3	3	64.80%	105,624
	D3	4	5	5	4	3	28.34%	46,194
	E1	4	4	3	5	5	6.86%	11,182
Dispute 9	A2	5	5	5	4	4	53.60%	87,368
	B1	4	5	4	3	3	27.57%	44,939
	C2	3	2	2	3	2	13.93%	22,706
	C3	4	4	5	5	5	4.90%	7,987
	D3	5	4	5	3	5	--	--
Dispute 10	A3	4	4	5	4	5	49.53%	32,195
	B2	5	3	5	3	4	33.33%	21,665
	E2	5	5	4	4	5	17.14%	11,141
Dispute 11	A1	4	3	3	5	5	83.13%	122,201
	B1	4	5	5	4	4	14.67%	21,565
	B2	4	3	3	3	5	2.20%	3,234
	C2	3	5	5	4	2	--	--
Dispute 12	A3	4	5	5	3	4	87.20%	85,456
	B2	4	5	5	4	5	8.61%	8,438
	C2	5	3	4	5	4	4.20%	4,116
Dispute 13	A2	5	5	4	4	5	46.79%	45,854
	B1	4	5	5	4	4	36.36%	35,633
	C3	5	5	4	4	4	11.54%	11,309
	D2	4	4	4	5	5	5.31%	5,204
	D3	5	5	5	4	5	--	--
	E2	4	5	5	5	4	--	--
Dispute 14	A2	5	5	5	5	4	59.48%	193,905
	A3	4	5	5	4	4	31.32%	102,103
	D2	4	5	4	4	5	5.60%	18,256
	D3	3	4	3	3	5	3.61%	11,769
	E2	4	5	5	5	4	--	--
Dispute 15	A2	5	5	4	4	5	80.73%	89,023
	A3	4	4	5	5	4	19.27%	21,197
	B2	5	5	5	4	4	--	--
	C3	3	3	4	4	3	--	--
	E2	5	5	4	4	5	--	--
Dispute 16	A2	5	5	4	4	5	62.91%	164,195

	A3	4	4	5	5	4	37.09%	96,805
	B1	4	5	5	4	4	--	--
	C3	3	3	4	4	3	--	--
	D2	5	4	4	5	5	--	--
Dispute 17	A2	5	5	5	5	4	62.03%	182,989
	B1	4	5	4	5	5	23.74%	70,033
	B2	3	3	4	3	5	12.13%	35,784
	C3	4	4	3	3	3	2.11%	6,225
	D3	5	5	4	5	4	--	--

According to the data in Table 3, loss from each risk can be calculated as weight multiplied by the loss in each dispute. The blank space in Table 3 means that the variance of relevant risk has been covered by the other risks in the identical dispute. Taking dispute 9 as an example, there are five different risk factors in dispute 9. After having run SPSS 18, it can be found that the previous four risks have already covered 100% variance. As a result, the risk of D3 has lost its function. The result of running SPSS 18 for each risk has been listed in the Appendix.

4.4 Outcome and analysis

4.4.1 Outcome of execution

For the sake of understanding the total loss triggered by each risk, the data in Table 3 should be added up. Table 4 has been designed to aggregate the loss of each risk and is categorized by Code, Name of risk and Aggregated loss of each risk in order to observe clearly. For instance, code A1 which represents the risk “option of pledged goods” leads to an aggregated loss of US$230,981. Likewise, each risk has its corresponding aggregated loss.

Table 5 - Aggregated loss of each risk

	Code	Name of risk	Aggregated loss of each risk (Unit: USD)
1	A1	Option of pledged goods	230,981
2	A2	Market price stability of pledged goods	1,248,375
3	A3	Quality of pledged goods	337,756
4	B1	Custodian techniques	364,982
5	B2	Assessment capability technique	162,911
6	B3	Information system	324,824
7	C1	Business condition of maritime logistics company	--
8	C2	Facility and regulation of safety management	104,801
9	C3	Warehouse supervision	25,521
10	D1	Profitability of pledger	--
11	D2	Solvency capability of pledger	36,357
12	D3	Customer credit record	141,138
13	E1	Legal environment	34,999
14	E2	Relevant economic policy	48,664
15	E3	Natural environment	--

In order to calculate the value of risk for each risk factor, besides the consequence (aggregated loss of each risk), probability is the other parameter. Table 6 has listed the place of occurrence for each risk. For example, A1 risk has occurred in dispute 6 and 11, so the times of occurrence for A1 risk is two. After having added all times of occurrence, there are altogether 70 times of occurrence for all risks. Therefore, the probability of occurrence for A1 is 2 divided by 70. Likewise, the probability for each risk can be found accordingly. All relevant data have been shown in Table 6.

Table 6 – Probability of occurrence to each risk

	Code	Name of risk	Place of occurrence	Times of occurrence	Probability of occurrence
1	A1	Option of pledged goods	Dispute 6, 11	2	2.86%
2	A2	Market price stability of pledged goods	Dispute 1, 2, 4, 5, 7, 9, 13, 14, 15, 16, 17	11	15.71%
3	A3	Quality of pledged goods	Dispute 10, 12, 14, 15, 16	5	7.14%
4	B1	Custodian techniques	Dispute 1, 4, 5, 9, 11, 13, 16, 17	8	11.43%
5	B2	Assessment capability technique	Dispute 2, 10, 11, 12, 15, 17	6	8.57%
6	B3	Information system	Dispute 3, 4, 5, 6, 8	5	7.14%
7	C1	Business condition of maritime logistics company	--	--	--
8	C2	Facility and regulation of safety management	Dispute 2, 9, 11, 12	4	5.71%
9	C3	Warehouse supervision	Dispute 9, 13, 15, 16, 17	5	7.14%
10	D1	Profitability of pledger	--	--	--
11	D2	Solvency capability of pledger	Dispute 6, 13, 14, 16	4	5.71%
12	D3	Customer credit record	Dispute 2, 3, 6, 7, 8, 9, 13, 14, 17	9	12.86%

13	E1	Legal environment	Dispute 3, 7, 8	3	4.29%
14	E2	Relevant economic policy	Dispute 1, 4, 5, 7, 10, 13, 14, 15	8	11.43%
15	E3	Natural environment	--	--	--

The final step is to calculate the value of each risk. According to the formula $R = P \times C$, the value of each risk has been calculated and listed in Table 7.

Table 7 – Value of each risk

	Code	Name of risk	Probability	Consequence	R=P×C
1	A1	Option of pledged goods	2.86%	230,981	6,606
2	A2	Market price stability of pledged goods	15.71%	1,248,375	196,120
3	A3	Quality of pledged goods	7.14%	337,756	24,116
4	B1	Custodian techniques	11.43%	364,982	41,717
5	B2	Assessment capability technique	8.57%	162,911	13,961
6	B3	Information system	7.14%	324,824	23,192
7	C1	Business condition of maritime logistics company	--	--	--
8	C2	Facility and regulation of safety management	5.71%	104,801	5,984
9	C3	Warehouse supervision	7.14%	25,521	1,457
10	D1	Profitability of pledger	--	--	--
11	D2	Solvency capability of pledger	5.71%	36,357	2,076
12	D3	Customer credit record	12.86%	141,138	18,150
13	E1	Legal environment	4.29%	34,999	1,501

14	E2	Relevant economic policy	11.43%	48,664	5,562
15	E3	Natural environment	--	--	--

In chapter 3, five categories of risk were classified. The risk value for each category can be known by adding the value of each risk in its own category. As a result, the risk value for category A is 226,842. The risk value for category B is 78,870. The risk value for category C is 7,441. The risk value for category D is 20,226. The risk value for category E is 7,063. The sequence of all risk categories in terms of numeric order can be described as $A > B > D > C > E$. Hence, the level of each risk category can be graphed as the following figure, where R_A, R_B, R_C, R_D, R_E stands for the level of risk for each category.

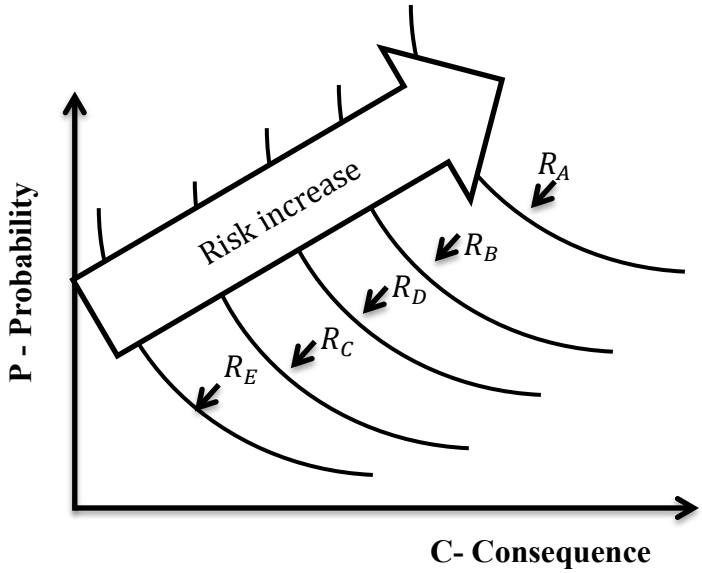

Figure 15 - Graph of $R = P \times C$ to each category

4.4.2 Analysis of the risks

Category A which is risk of pledged goods has three risk factor: Option of pledged

goods, Market price stability of pledged goods, and Quality of pledged goods. CSL should take precautions to select relevant pledged goods. The pledged goods shall be adequate to the principles illustrated in Table 2. After WRP business becomes mature, CSL could expand the span of pledged goods so as to meet the demand of the market. Furthermore, it is difficult to predict market price for pledged goods, especially the price of raw materials. CSL should collect market information on related pledged goods on a daily basis. For example, CSL could estimate the market trend with the help of the future market. If the current price deviates from the future market price, the corresponding risk might increase. If the future market price goes lower, the demand for pledged goods would decrease as well as the market price. Therefore, the foremost risk for WRP is how to opt for pledged goods and collaborate with commercial banks to check the situation of pledged goods (Andersson et al, 2003; Diamond, 1984).

Category B which is risk of various techniques is embodied by three risk factors: Custodian techniques, Assessment capability techniques, and Information system. CSL could be recommended to take proactive measures so as to decrease the risk. CSL should take into account purchase measuring devices to guarantee the amount of pledged goods in the event of burglary. Sometimes, because of the limitation of warehouse capability, raw material is stored in open-air yards and burglary can easily take place. The quantity of raw material cannot be measured visually. Hence, measuring devices are necessary for WRP if CSL supervises large amounts of raw material. On the other hand, information technology is requisite to upgrade working efficiency and optimize business flow. For instance, RFID technology is of prominent function in WRP and could guarantee pledged goods under control during the whole process. Additionally, information technology can also be used to effectively communicate with commercial banks to transmit data of pledged goods.

As far as assessment capability technique is concerned, CSL should cooperate with third-party assessing companies in order to judge the quality of pledged goods (Beal, 1998). In some circumstances, SMEs could possibly cheat logistics companies by pledging low quality goods instead of high quality goods so as to acquire a higher loan amount.

Category C which is risk of business operation and supervision consists of Business condition of maritime logistics company, Facility and regulation of safety management, and Warehouse supervision. CSL should consider taking preventive action on these risks. The internal managerial level for WRP in CSL could lead to the collapse of the business. Despite the fact that the risk value related to the business condition of maritime logistics companies is not mentioned by experts, it still possesses its function in risk management of WRP because other conventional logistics business could affect the healthy development of WRP. Regarding the internal management, CSL should take the following measures.

- Attempt to stipulate a perfect inspection system of safety and verification for pledged goods. It can contribute to improving the capability of warehouse management.
- Try to formulate relevant regulation on honest and clean behavior of internal controllers. To some degree, internal controllers might interact with pledgers to counterfeit warehouse receipts in order to acquire higher loan amounts.
- CSL should enhance the controlling capability of warehouse supervision, which could be divided into different sorts including supervision in own warehouse, supervision in leased warehouse, supervision in pledger's warehouse, supervision of same pledged goods in a different place. Therefore, CSL should draw various regulations in terms of different circumstances, like personal training, and performance examination.

Category D is related to Risk of customer credit and is composed of Profitability of pledger, Solvency capability of pledger, and Customer credit record. To some extent, the profitability and solvency capability of the pledger are related with each other. If the pledged goods are profitable to the pledger, the solvency capability of the pledger will become higher. Accordingly, the customer credit record of the pledger might be reliable. Thus, CSL could adopt preventive step to minimize these risks. CSL should cooperate with other relevant institutions besides commercial banks to establish an effective credit assessment system for pledgers in order to overcome the deficiency of asymmetric information and commercial opportunism. On the other hand, CSL should know about the financial background of pledgers on a regular basis to reinforce supervision of pledges.

Category E is Risk of industry and externality and is composed of Legal environment, Relevant economic policy, and Natural environment. CSL should take reactive measures to tackle these risks and cooperate with governmental departments to facilitate the healthy development of WRP as a dominant player in China. As far as natural environment is concerned, CSL ought to pay ultimate concern on it and regulate contingency planning because if something catastrophic happens, CSL could confront irredeemable loss.

4.5 Summary

In chapter 4, $R = P \times C$ methodology which construes the principle between likelihood of occurrence and corresponding consequence of hazards has been introduced briefly. Meanwhile, PCA which could easily find out the variance of each risk in various disputes has been explained. Furthermore, the fundamental background of CSL has been shown and the specific areas involved in disputes have

been indicated in Figure 14. Altogether, seventeen disputes regarding WRP happened in CSL and the relevant information of each dispute has been listed explicitly.

Additionally, five experts were involved in marking the level of each risk regarding each dispute in order to understand the degree of importance. After having collected the raw data, SPSS 18 was helpful software to compute the variance which could delegate the weight of each risk. In accordance with the weight of each risk, the loss caused by each risk could be calculated. The aggregated loss of each risk was found after adding loss related to each risk. The probability of each risk could be known in terms of times of occurrence of each risk. Thus, according to $R = P \times C$, the risk value of each risk was settled as well as the risk value of each category. On the basis of risk value of each category, the different measures to handle each risk in a qualitative way were analyzed.

Chapter 5 Conclusion and outlook

5.1 Conclusion

In this dissertation, the global logistics market is briefly reviewed and finance logistics as well as WRP are explained and illustrated in detail. WRP is a newly born logistics business model not only in the Chinese market but also in the world market. It fills up (or reduces) the gap between commercial banks and SMEs by way of intermediaries, the role of which could be played by maritime logistics enterprises. Currently, on the one hand, owing to the world economic recession, SMEs are often challenged by the lack of capital. On the other hand, commercial banks would offer financial support to SMEs due to capital security and financial risks. How to solve the dilemma between commercial bank and SMEs has been very problematic. Therefore, third-party logistics enterprises have emerged as the time requires and formed a bridge to link commercial banks with SMEs. Meanwhile, third-party logistics providers have developed WRP in order to enhance the economic support for SMEs through commercial banks.

Because of the rapid development of WRP in China, commercial and operation disputes often happen with, sometimes, serious consequences. Chinese maritime logistics providers need urgently to be capable of controlling the risks with regard to WRP. In this dissertation, five categories of risk are listed as per the business flow of WRP and each category of risk is composed of three risk factors. For example, risk of pledged goods is composed of option of pledged goods, market price stability of pledged goods and quality of pledged goods. Altogether, fifteen risk factors are found and explained.

Based on the data of CSL as research case, analysis was carried out to identify the rank of each category of risk. It suggests that CSL should focus its limited resource on the management of the risk in terms of the risk levels. Expert evaluation method combined with seventeen disputes taken place in CSL in recent years is applied to indicate the interval of [1, 5] of occurrence. The higher the mark, the more probable of dispute. After having operated SPSS 18, the variance of each risk factor related to corresponding disputes has come out and the variance can be recognized as weight of loss. Accordingly, the loss value triggered by relevant risk factors is known. On the other hand, the probability of occurrence to each risk is calculated by the numbers of occurrence. Thus, the value of each category of risk can be known through $R = P \times C$.

The main finding of the dissertation is that the rank of each category of risk regarding WRP has been found in terms of the loss value. The higher, the more risky. The most important category of risk for CSL is the risk of pledged goods: Risk category A (R=226,842). The second category (B) of risk, which is 3 times less risky as category A, is the risk of various techniques followed by risk of business operation and supervision, risk of customer credit, risk of industry and externality. In accordance with the importance of risk, CSL should take corresponding measures to manage it effectively.

In summary, the research groups the risks related to WRP to five different categories in terms of empirical background. Furthermore, the original contribution of the research is to combine PCA and $R = P \times C$ with WRP to increase the level of risk management in quantitative way. Finally, it is hoped that the research is meaningful for logistics provider to implement risk assessment on WRP instead of commercial bank.

5.2 Outlook

- The risk factors regarding WRP should be identified and selected as widely as possible. Despite the fact that CSL is a well-known maritime logistics provider in China and has been specializing in WRP practices, other maritime logistics companies in China e.g. COSCO etc. should also have been included which is not the case for this study. A broader scope of risks included would lead to a different grouping of risks. Therefore, risk factors should be collected as many as possible so as to be analyzed broadly.
- Expert Evaluation Method is commonly applied to quantify the indicators. However, it can easily be biased due to unavoidable subjectivity to some extent. Hence, Delphi Method could be used to reduce such bias.
- Further research may be carried out on Cost Benefit Analysis. CBA is a systematic process for calculating and comparing benefits and costs of a project, decision or government policy. In CBA, benefits and costs are expressed in monetary terms, and are adjusted for the time value for the money so that all flows of benefits and flows of project costs over time are expressed on a common basis in terms of their NPV (Sen & Amartya, 2000). Thus, CBA is a useful methodology for CSL to compare the input with output based on risk management.

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Appendix - Total Variance Explained

Component (Dispute 1)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.354	45.118	45.118	1.354	45.118	45.118
2	1.000	33.333	78.452			
3	.646	21.548	100.000			
Component (Dispute 2)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.800	45.008	45.008	1.800	45.008	45.008
2	1.151	28.774	73.782	1.151	28.774	73.782
3	.957	23.920	97.702			
4	.092	2.298	100.000			
Component (Dispute 3)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.784	59.482	59.482	1.784	59.482	59.482
2	1.000	33.333	92.815			
3	.216	7.185	100.000			
Component (Dispute 4)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.959	48.970	48.970	1.959	48.970	48.970
2	1.512	37.802	86.772	1.512	37.802	86.772
3	.488	12.198	98.970			
4	.041	1.030	100.000			
Component (Dispute 5)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.251	56.272	56.272	2.251	56.272	56.272
2	1.119	27.985	84.258	1.119	27.985	84.258
3	.504	12.605	96.862			
4	.126	3.138	100.000			
Component (Dispute 6)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.220	55.501	55.501	2.220	55.501	55.501
2	1.486	37.155	92.655	1.486	37.155	92.655
3	.263	6.579	99.235			
4	.031	.765	100.000			

Component (Dispute 7)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.224	55.598	55.598	2.224	55.598	55.598
2	1.130	28.259	83.857	1.130	28.259	83.857
3	.625	15.625	99.482			
4	.021	.518	100.000			
Component (Dispute 8)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.944	64.798	64.798	1.944	64.798	64.798
2	.850	28.343	93.141			
3	.206	6.859	100.000			
Component (Dispute 9)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.680	53.602	53.602	2.680	53.602	53.602
2	1.378	27.566	81.168	1.378	27.566	81.168
3	.697	13.933	95.101			
4	.245	4.899	100.000			
5	.000	.000	100.000			
Component (Dispute 10)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.486	49.530	49.530	1.486	49.530	49.530
2	1.000	33.333	82.864			
3	.514	17.136	100.000			
Component (Dispute 11)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.325	83.131	83.131	3.325	83.131	83.131
2	.587	14.671	97.802			
3	.088	2.198	100.000			
4	.000	.000	100.000			
Component (Dispute 12)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.616	87.195	87.195	2.616	87.195	87.195
2	.258	8.611	95.805			
3	.126	4.195	100.000			

Component (Dispute 13)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.807	46.790	46.790	2.807	46.790	46.790
2	2.182	36.362	83.151	2.182	36.362	83.151
3	.693	11.544	94.695			
4	.318	5.305	100.000			
5	.000	.000	100.000			
6	.000	.000	100.000			
Component (Dispute 14)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.974	59.475	59.475	2.974	59.475	59.475
2	1.566	31.319	90.794	1.566	31.319	90.794
3	.280	5.600	96.394			
4	.180	3.606	100.000			
5	.000	.000	100.000			
Component (Dispute 15)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.037	80.732	80.732	4.037	80.732	80.732
2	.963	19.268	100.000			
3	.000	.000	100.000			
4	.000	.000	100.000			
5	.000	.000	100.000			
Component (Dispute 16)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.145	62.910	62.910	3.145	62.910	62.910
2	1.855	37.090	100.000	1.855	37.090	100.000
3	.000	.000	100.000			
4	.000	.000	100.000			
5	.000	.000	100.000			
Component (Dispute 17)	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.101	62.028	62.028	3.101	62.028	62.028
2	1.187	23.741	85.768	1.187	23.741	85.768
3	.606	12.125	97.893			
4	.105	2.107	100.000			
5	.000	.000	100.000			

Extraction Method: Principal Component Analysis.